



Examiners' Report Principal Examiner Feedback

Summer 2023

Pearson Edexcel Level 3 Certificate
In Mathematics in Context (7MC0) Paper 1

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Publications Code 7MC0_01_2306_ER*

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Introduction

This session saw a slight increase in the number of entries compared to that of 2022 and students appeared to be well prepared for some of the topics that are beyond GCSE content, but a small number of topics included in the specification and some content that should be familiar from GCSE Mathematics was not always attempted well. Students did not always appear to be able to respond to questions that were set in a non-routine way successfully or were not able to take a creative approach to solving problems.

The majority of the paper appeared to be accessible to most students, with the majority of questions being attempted. However, calculations were not always shown clearly or systematically, and communication of results was not always clear.

The level of engagement with content that should be familiar appears to be as expected. However, students appeared to not always be able to successfully engage with the correct information provided in the source booklet in order to respond to questions successfully, or unable to select an appropriate method to find a solution.

Questions that require interpretation or evaluation of results, justification of mathematical reasoning or a conclusion-based comment relating to the method used, are still areas of weakness for students. Centres should try to give students opportunities to revisit and practice topics from the GCSE specification, particularly content appearing on the Higher tier such as drawing and using box plots.

Report on Individual Questions

Question 1

Part (a) of the first question required students to interpret the information in a table and the text to write one number as a fraction of another. Just over half of the cohort successfully gained the mark with the most common error being to use either the wrong time period or using the total number of live games shown on TV as the denominator rather than the total number of games of a season which was provided in the text. Interpretation of the source document was again an issue in part (ii) due to not using the fact that 380 games are played each season.

Part (b) was generally attempted very well, with part (i) being answered correctly using a variety of approaches. Whilst some students were able to select the correct information from the source booklet, many forgot to calculate the cost per game before finding the percentage change. However, partial marks were often awarded for showing a valid method to calculate the percentage change for the total cost of the period rather than the cost per game. Careful reading of the question would have greatly improved student success on this question.

Question 1 continued

Performance on the three parts relating to the use of a spreadsheet in part (c) varied. Whilst the majority could correctly interpret the numerical values in the formula in the correct context, only two thirds could use the formula to calculate the value of the cell required. Despite only needing to substitute a value into a simple formula and only a third of the cohort could provide a clear explanation as to why the formula would not work, for less than 10 games in part (iii). Students appeared to not be able to understand that using a value less than 10 in the formula would lead to a deduction of a fee that was explained to be a guaranteed sum in the source booklet.

Question 2

It was very pleasing to see the majority of students answer part (a) correctly by using the model to find the difference in prize money to gain full marks. When full marks were not awarded, it was often due to omitting the millions from their answer or for only finding the values for each finishing place and not subtracting these to find the difference.

Part (b) required students use and interpret sigma notation for an arithmetic series, to find the total prize money given. A correct explanation of what 20 represented was given by a large proportion of the cohort in part (i) but success parts (ii) and (iii) were less frequent. A mark was often awarded for using the model to calculate at least one term, but less than half of these students were able to continue correctly to sum at least 10 terms or find the total sum. Although the formula for the sum of an arithmetic series is provided on the formulae sheet in the source booklet, only a few used this, with many preferring to use a listing method to find the total. Performance in part (iii), which required a comparison of the total obtained in the previous part to the actual total shown in the data source was not as expected. This was due to many either not providing a comment about the reliability or not making a comparison of the two values and simply stating a reason such as its an estimate or extrapolated.

Question 3

Engagement with the table in the data source was excellent when answering part (a) but less success was shown in subsequent parts of the question. The majority of students correctly used the information in the table to calculate the number of points awarded and gained full marks. However, performance in part (b) was not as successful and although many could correctly identify the correct information to use to make a comparison, many did not attempt to use probability to make the comparison needed to answer the question correctly. They simply tried to write an explanation which was not enough to provide a full and valid justification. Of those who began to use probabilities, not all found comparable figures in a common format to fully support their decision.

Question 3 continued

The final part of the question presented a slightly different style of assessing students understanding of proving independence of events in a scaffolded way and many found part (ii) and (iii) in particular challenging. The mark was often awarded for a correct probability in (i), one of the two marks was often awarded for a partially correct probability in (ii). Very few realised that they could use their answers to parts (i) and (ii) to determine that as the two probabilities were not equal and the events were not independent, despite the question specifically telling them to use these answers. The most common cause of a lost mark in (ii) was to ignore the conditional element and use the wrong denominator and a written explanation rather than a comparison of probabilities was the most common incorrect response in part (iii). A large number of students who attempted to use probabilities to answer part (iii) chose to use the alternative method to test for independence, but without great success due to using incorrect probabilities.

Question 4

The final question in the first section of the paper required students to use a given formula to determine how much a football player was being overpaid based on their transfer value. Whilst many students correctly identified the value to substitute into the formula to gain a mark, many did not find the value of the overpayment or gave a final inaccurate answer. Of those who gained no marks at all, it was often for using the incorrect value of 45 000 000 rather than just 45 due to a misinterpretation of the terms stated, which gained no marks.

Question 5

It was pleasing to see that the majority of students were able to accurately plot both time series graphs for the given data to obtain at least 2 of the 4 marks available in part (a). The final mark was often lost due to not joining the data points with straight line segments and the first mark was occasionally lost for not providing appropriate labels on their graphs or a key, but this was less frequently seen.

Part (b) was also attempted extremely well with nearly all students gaining at least one of the two marks for using their time series graphs to evaluate the two claims. Although a clear decision about each claim was not always provided, the explanations often implied a valid decision which was acceptable. Of the students who only gained one of the two marks, it was often due to not providing a full explanation relating to figure 1 in the source booklet; about access to key services being affected by the time taken to travel or for providing a contradiction. A small number of students mixed up urban and rural and provided the incorrect evaluations, but this was rare.

Question 6

This question was not answered well, with many students unable to identify that there was not enough information provided to be able to decide that the statement was correct, or that percentages were not directly able to be compared. Unless the starting totals were similar or equal, with the majority not realising that percentages alone could not allow for a valid conclusion to be made and that figures would be needed for such a conclusion to be supported. Students should be encouraged to consider what quantifiable data is available such as are there totals or equal amounts of data, and whether the type of information provided is enough to be able to make such comparisons.

Question 7

Calculating the standard deviation is a skill beyond the content of Higher tier GCSE but this did not seem to discourage students, and many were able to gain full marks in part (a)(i). When a mark was lost, it was often due to not calculating the value of the mean. Explaining the effects on both of these statistical measures when another value was included appeared to be more challenging, with many only gaining one of the two marks available in part (ii). Whilst many realised that an extremely large value would cause the mean and standard deviation to increase, this was not always clearly explained in an unambiguous way or no justification that the large value was the cause was provided.

Although using a formal method to find outliers for a data set is a new skill beyond GCSE, it is a routine procedure on this specification and the majority were not able to select the correct values to use for the lower and upper quartiles in (b)(i). However, when the correct quartiles were identified, full marks were often awarded but occasionally the final mark was lost due to not formally stating that there were no outliers. Arithmetic errors often occurred when calculating the interquartile range. A very small number of students were able to identify the correct LQ and UQ values correctly, but then used alternative values when trying to use the equations given. Students were required to draw a box plot in part (b)(ii) with many students successfully gaining both marks available. The most common cause of a lost mark was often due to plotting an incorrect median. Marks were frequently awarded for plotting incorrectly identified quartiles, accurately. Students should be given opportunities to practice being able to identify quartiles and the median from data sets that contain both an even and odd number of pieces of data and of data sets presented in a variety of ways, such as a list or a table.

Despite marks often being lost in both part of part (b), it was pleasing to see that students were often able to continue onto part (c) and were able to successfully compare the distributions using the box plot provided and either their own box plot or the data in the question. The majority of students made valid comparisons of both the median and a measure of spread, most commonly the inter-quartile range. When a mark was lost it was often due to only comparing one of these measures or not providing a comparison in

context. It is important to encourage students that a comparison of two distributions should be more than a simple statement such as the median was larger or that the range was smaller.

Question 8

Being able to correctly interpret the result of their calculation was the main cause of a loss of mark in part (a) of the final question, with many concluding that the accurate value of 6.3 that they obtained was affordable. This would suggest that students did not fully read or understand the example in the text before the table, which explained that a calculated value based on the earnings needed to be less than or equal to the listed affordability ratio value.

Part (b) was very well attempted with many students gaining some credit, usually for accurately calculating the value of the product moment correlation coefficient in part (i). Of those who gained partial or full credit in (i), not all were able to gain both subsequent marks in parts (ii) and (iii). A lack of being able to relate how this value showed linear regression was suitable, was clear as part (ii) was not often correctly answered. However, many were able to conclude that a correlation coefficient that was closer to one provided a better fit to a linear model and gained the mark in (iii). Centres should reinforce that values for correlation coefficients should lie between -1 and 1 as many final values in part (i) were outside of this range which subsequently prevented the award of the marks in parts (ii) and (iii).

The final part question of the paper was answered well, with many students gaining full marks. Partial marks were often being awarded for accurately using the equation of the regression line or for a correct substitution and a comment about the reliability but not having an answer in the acceptable range. It was very pleasing to note that of the students who did comment on the reliability, many correctly identified that the data was not within range or gave an alternative suitable comment about external factors, such as a crash in the market affecting the reliability.

Based on their performance on this paper, students should:

- Ensure they read the question carefully both at the start and end of answering a question to make sure they have fulfilled what the question is asking them to do, such as finding a difference.
- Practice being able to select the relevant information from the source booklet to enable them to answer questions, including written text.
- Check that their answer is of the correct magnitude and seems to be sensible.
- Make use of the formulae sheet provided in the source booklet.

- Develop interpretation of answers in the context of the question, focussing particularly on how written responses relate to the mathematical skills being applied.

